

How the Slough Gets Its Water.

Which habitat video: Slough

Subject: Reading, Writing, Science and Social Studies

Duration: 1 Week

Group Size: 22

Setting: Classroom

Grade: 4-5

Standards:

Common Core – LACC.4.RI.1.1, LACC.5.RI.1.1 and LACC.5.W.3.8

NGSSS - SC.4.L.17.4, SC.5.N.1.1 (correlates with LACC.5.W.3.8), SS.4.G.1.1 and SS.5.G.1.4

Vocabulary: Watershed, wetland, slough, limestone, aquifer and habitat

Materials

- Appendices A - D
- Wooden blocks
- Labels or Permanent Marker

Objective(s):

Guiding Question: What does water do for the Everglades?

Critical Content: Understand how variations in water's quantity, quality, timing, or distribution can change the shape of the ecosystem or cause parts of it to collapse.

Student Objectives: Students will...

- Focus on using textual evidence and/or in the form of direct quotations to support basic comprehension and inferences
- Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources
- Recognize ways plants, animals, weather and people can impact the environment
- Define a problem, analyze information, make predictions, and defend conclusions
- Identify physical features of Florida and Construct a map to display a geographic information

Method

Students will recall any information they know about the Everglades and will then analytically read an article. They will discuss within their group the new information in the article, in addition to what they already knew. As a group they will respond to the guiding question, and then each group will share their response with the class. The students will then watch the slough video and they will take notes for main idea concepts. After watching the video they will then work with their groups to share their notes and change or enhance their original response to the guiding question. The teacher will probe students, within their groups, with critical level questions. As a follow-up activity, they will participate in a personal learning activity and a game that demonstrate how variations in water's quantity, quality, time or distribution can change the shape of the ecosystem or cause parts of it to collapse.

Background

Everglades National Park is synonymous with **water**. It lies at the mouth of a system of lakes and rivers that collects water from nearly 18,000 square miles of southern Florida and carries it to the sea. The Everglades receives 50 to 60 inches of rainfall each year, making it one of the wettest places in the country. About 95 percent of the park is covered by fresh or brackish water, including the 850 area miles of shallow Florida Bay and the coastal estuaries from Whitewater Bay to the Ten Thousand Islands. This wetland interconnects plants, animals and humans; making the Everglades National Park an essential component of South Florida. The park has two sloughs that are an important component for the survival of plants and animals throughout the natural seasonal cycle of wet and dry.

Suggested Procedures:

Activity 1

- Have each student write a list of all they know about the Everglades.
- Provide the students with the “Water and the Everglades” article to read independently and the guiding question (Appendix A).
- After reading the article have students add to their list any new information that has added to their level of knowledge and respond to the guiding question; their response should be supported by using textual evidence and/or direct quotes.
- Have students get into groups to share their list, discuss the information from the article and their response to the guiding question.
- To demonstrate their understanding of the article each group will collaborate to unify the different responses by using cite evidence; they will share the one response with the other groups.

Activity 2

- The teacher will probe the students with critical level questions before watching the video, and as a group they can interact with the possible response to the questions; the teacher interacts and monitors the group’s responses to the questions (Appendix B).
- Explain to the students that they will be watching a video about the slough habitat; ask students to take notes from the video.
- The teacher will provide main idea points for students to focus on for note taking (Appendix B).
- Play the Slough video for the class located at the following web address, stopping and replaying the part of the video that discusses main idea points (time 7:57): <http://www.nps.gov/ever/photosmultimedia/mountainsandvalleys.htm>
- After watching the video and taking notes, within the groups, have students share their notes; the teacher will probe students with critical level questions (Appendix B).

- To demonstrate their understanding of the slough video the students will apply concepts learned in a learning style activity (Appendix C).

Activity 3

- The class will review and discuss the article, slough video and learning style activity.
- The students will construct a tower of wooden blocks representing a complete, healthy and efficiently operating park ecosystem with its elements interconnected by water (Appendix D).
- To demonstrate their understanding students will create a digital presentation of one topic relating to the Everglades' water flow or slough habitat.

Extension: The students can then create a map of the Everglades' current water flow and show where the sloughs are located.

Evaluation: When students demonstrate their understanding throughout their activities they will show how variations in water's quantity, quality, timing, or distribution can change the shape of the ecosystem or cause parts of it to collapse.

Category	3	2	1
Water Variations	The student is able to list and explain three variations in water that can shape the ecosystem	The student is able to list and explain two variations in water that can shape the ecosystem	The student is able to list and explain one variations in water that can shape the ecosystem
Plants and Animals	The student is able to identify and explain Cause/Effect for three animals and/or plants affected by water variation	The student is able to identify and explain Cause/Effect for two animals and/or plants affected by water variation	The student is able to identify and explain Cause/Effect for one animal and/or plant affected by water variation

Water and the Everglades

The Everglades National Park was established in 1947 to preserve its uncommon diversity of plants and animals. The life of this system is completely dependent on water. The Seminole Indian word for the Everglades is, Pa-hay-okee, which means “grassy water.” Water is an important factor to the evolution of the park landscape, which was largely built by marine organisms and emerged from the sea as water was drawn up into continental glaciers during the Great Ice Age. With time, the surface of the land was shaped by a weathering process which resulted in the formation of **limestone**. The entire state of Florida is underlain by limestone; this limestone creates Florida’s aquifer, the underground rocks that hold water.

Historically, the rain that fell on the Kissimmee Valley eventually made its way south into Lake Okeechobee; the water that spilled over the lake’s southern edge flowed southward through the Everglades. Only inches deep in most places, but nearly 50 miles from side to side. This flat landscape is just barely above sea level. Currently the section of the Everglades preserved within the park is actually a broad, shallow river that continues to flow southward very slowly. This shallow moving water enters the park directly in the form of rainfall, or indirectly by a managed **watershed**. Today much of the natural water flow is diverted for other uses before it reaches the park.

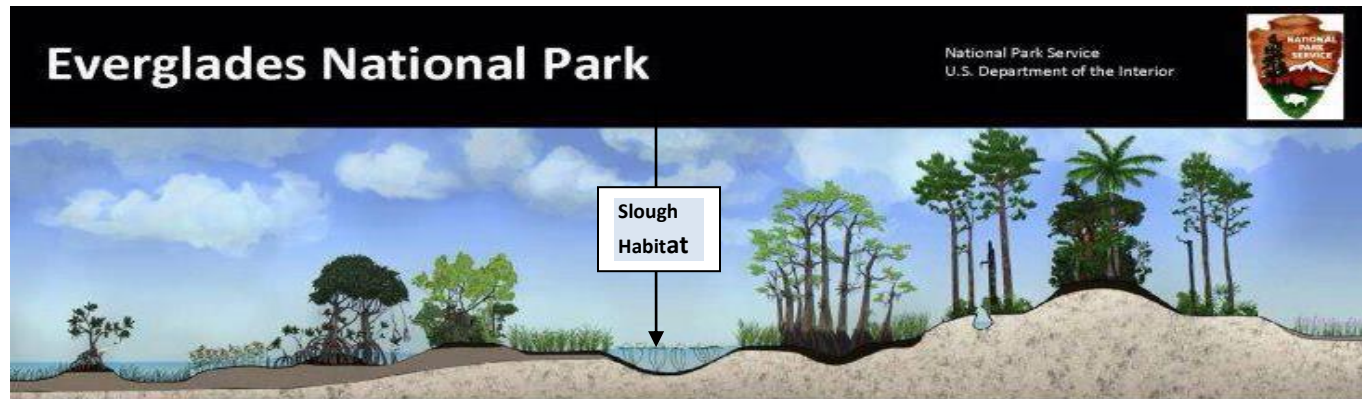
Rain is the source of most of the water that enters the Everglades. Fifty to 60 inches fall each year in the park and throughout most of southern Florida. On an average day in Florida, 150 billion gallons of rain fall, and another 25 billion gallons flow into the state through rivers and streams. Most of the rain-about 70 percent of it-occurs from May through September, followed by an annual winter dry season. Plants and animals adapt to the *ebb* (go down) and flow of water, the annual transition from drought to flood (wet and dry).

Within the Everglades National Park’s grassy water a natural distinctive **habitat** is found, a freshwater **slough**. The freshwater slough is the deepest and wettest habitat in the park. Even in the dry season, you can find water in the deeper parts of the slough. There are two sloughs in the Everglades, Shark River Slough, found in Shark Valley, and the Taylor Slough, which flow near Royal Palm. This aquatic habitat provides for a diverse community of plants and animals. The slough is a place where a variety of animals congregate for their survival, during the dry season.

An example of the interconnectedness of plants and animals with water is the apple snail. Living in freshwater marshes and other **wetlands**, the apple snail require shallow water and emergent aquatic vegetation to reproduce. It is the exclusive food source for the endangered snail kite in the Everglades. If the water level is not high enough, the apple snail population may decline below levels necessary to sustain the snail kite, and that endangered bird may become extinct. Too much water can negatively affect other animals, such as the wood storks.

The quality, timing (when the park receives the water), and distribution of the water are as important as the quantity (or amount) of water the park receives. Everglades National Park is only a portion of a much larger wetland ecosystem; a system that is sought out by plants, animals and humans. To-date water is the most critical issue facing the park.

Adapted from - A Water Resources Manual from Florida's Water Management Districts and The Watercourse and The National Park Foundation



The slough is a shallow channel of slow-moving water; it is the deepest and wettest habitat in the park.

Power Words

Aquifer – a layer of underground rock or sand that stores water

Habitat – the natural environment of an organism; the place where an organism or community of organisms lives.

Limestone – highly porous rock formed over millennia from shells and bones of sea animals

Watershed – land area that contributes runoff to a water body; also known as a drainage basin

Wetland - areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions; such as swamps, marshes, bogs and similar areas

Guiding Questions before Watching the Video

- I. **Define** slough?
- II. **How many** slough(s) habitat(s) does the Everglades National Park have?
- III. **Explain** the main source of water in the Everglades.
- IV. **Define** wetlands.
- V. What **problems** would the Everglades face if the water would stop flowing?

Main Points for Note Taking

- I. What is the **seasonable rhythm** of the slough?
- II. What happens in the **different seasons**?
- III. What can you **find in the slough**?
- IV. **Name the sloughs** found in the Everglades?
- V. How is the **water controlled**?

Questions after Watching the Video

- I. What happens during the wet season in the slough?
- II. What happens during the dry season in the slough?
- III. Differentiate between the two seasons.
- IV. Explain the nonliteral statement, "The slough is the main artery of the River of Grass."
- V. What are ways that plants, animals, weather and people can impact the environment in the slough?

My Learning Style Activity

Select at least one activity that you would like to do and share with the class.

Draw a poster picture to show the two major sloughs	Demonstrate through an experiment how the bladderwort catches its prey.	Pretend the Everglades will change in the next 10 years. Draw the new Everglades on chart paper.
Teach a lesson from about how the slough's annual cycle, wet and dry, affects the wildlife.	Read 3 informational texts about the Everglades' sloughs. Talk about how the information is similar and/or different. Write 5 slough facts on paper.	Write a story or journal about the slough.
Present reasons why the slough is the place to be during the dry season.	Act Out something you have learned about the slough. Make a stick puppet for your skit.	Build a home of a slough and show the wildlife in it.

Water Tower Activity

Procedure – Warm up: Tell students that natural environments must have soil, air, sunlight, and water in the proper amounts for species to survive and prosper. Ask students to cite examples of Everglades' plants or animals that they have studied or heard about. How are those living things connected with water? With each other? What is their role in the Everglades community? Are they endangered? What is endangering them? Is their endangerment related to water?

The Activity:

1. Label four blocks to represent the basic environmental components essential to all life: earth, air, sunlight and water. Place these blocks side by side, forming the foundation for the tower. Remind students that all living systems are built on a foundation of these factors, and that they are inextricably linked.
2. Have each student select a block and carefully place labels to it. (**Note:** Labels should be placed or written on sides and ends of blocks so that the animal or plant name is visible from all side of the tower.) Provide students with copies of **Common Freshwater Plants** and Animals (page 6). Direct each student to select a different plant or animal from the list on page 4 and write its name and/or draw its picture on each of the labels. **Note:** So that a diverse representation of organisms from each category is selected divide the class into groups so that one group selects from the fish category, and so on.
3. Randomly place a water block across the four foundation blocks. Two students should place their blocks next to the water block, completing the second level of tower. (Only the foundation level will contain four blocks.) Repeat the process with the teacher placing the water block first. Each layer of the three blocks should alternate direction as the students and teacher continue to build the tower. Point out to students that this arrangement of block represents a healthy ecosystem with each member of each species depending upon all the others to help maintain the balance. Water connects all members through all layers.
4. Once all students' blocks have been placed on the tower, have students take turns drawing **Water Event Cards** from the deck. (**Note:** Duplicate and cut out cards; shuffle them to mix thoroughly.) Ask each student to announce to the class the water event on the card and its consequences. One-third of the cards describe a negative event that affects the water balance in the system; direct that water block be removed from the tower. One-third of the cards describe a positive event; direct that a water block be added to the tower. (The remaining cards are blank and have no effect on the tower.) All blocks must be removed or added to the tower from below the top layer. Each block removed from or added to the column represents a modification in the water balance of the system (excess rain, extended drought, early water releases by water manager, optimum water levels, restored sheet flow, etc.)

Adapted from The Watercourse & National Park Foundation

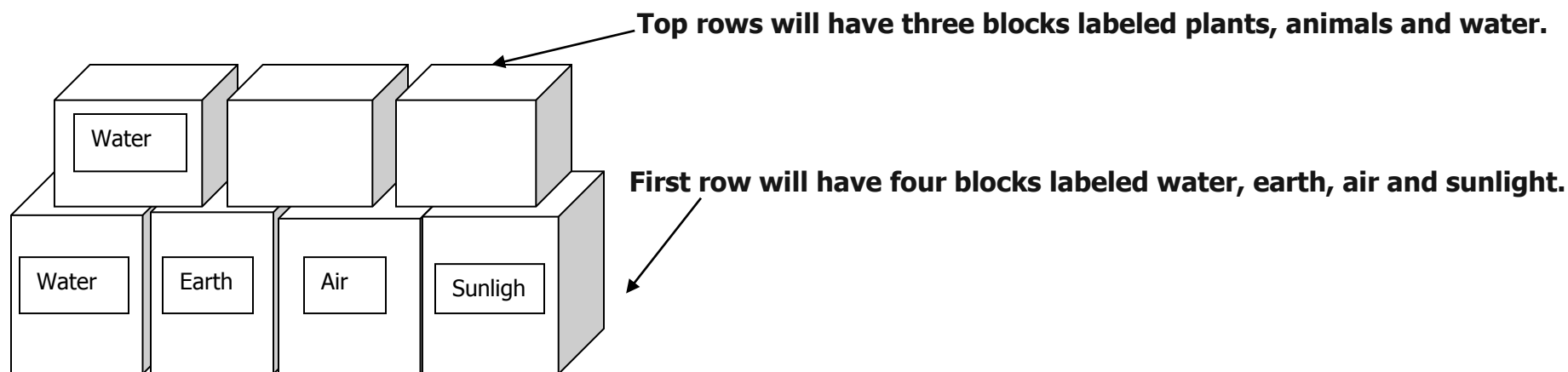
Appendix D

5. Continue playing the game until all of the **Water Event Cards** have been drawn or until the column of blocks can no longer support itself and tips over. At this point, the ecosystem has been so changed, due to alterations of its water balance, that it no longer looks like it did in the beginning-or it has collapsed.

Warp up: As students to suggest how changes in the water balance of the ecosystem will affect any of the plants or animals in the food chain. Would additional changes result in greater or more obvious effects?

Remind students that the game they have played represents interrelationships amount species and the role of water in the ecosystem. How many water blocks were pulled from or added to the stack of blocks before it collapsed: Did students realize that as more changes were made, the tower became less stable and that each turn at removing or adding a block became more risky: Did the tower collapse prematurely when a block was removed or added too quickly or carelessly: What conclusion can be drawn.

At any point during the addition or removal of the blocks, did anyone say something such as, "Be careful, it's going to collapse?" Of all the students who took a turn at removing or adding a block, who felt most responsible for the crash? Was only one person responsible for the collapse or were all who participated responsible?



<p>Water Event Card</p> <p>Hurricane strikes southern Florida. Fifteen inches of rain fall in 24 hours. REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Insufficient freshwater flow to coastal estuaries. Salinity levels rise REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Drought continues. Water levels drop to all time low. REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Saltwater detected in Biscayne Aquifer. REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>High levels of pollutants detected in The water conservation areas. REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Population grows at unprecedented rate. Demands on water supply result in redistribution of water from conservation areas to urban centers. REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Water released prematurely from water management structures. Wood stork nesting failures recorded. REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Jetport project north of Everglades National Park renewed. REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Algal bloom spreads in Florida Bay. Turtle grass beds threatened. REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Heavy rains in Everglades Agricultural Area force water managers to pump nutrient-laden water back into Lake Okeechobee. Phosphorous and nitrogen levels rise, causing algal bloom. REMOVE A WATER BLOCK</p>

<p>Water Event Card</p> <p>Water quality at higher levels than last year.</p> <p>REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Congress passes legislation to further protect the Everglades.</p> <p>REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Water at optimum levels for apple snail reproduction. Snail Kite population increases.</p> <p>REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Project underway to restore the Kissimmee River to its historic configuration.</p> <p>REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Storm water Treatment Areas constructed. Pollutant levels significantly reduced.</p> <p>REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Dairy farmers adopt best management practices.</p> <p>REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Ecosystem restoration project underway.</p> <p>REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>Plan formulated to restore natural sheet flow to the Everglades.</p> <p>REMOVE A WATER BLOCK</p>
<p>Water Event Card</p> <p>Biologists report successful alligator reproduction due to optimum water levels.</p> <p>REMOVE A WATER BLOCK</p>	<p>Water Event Card</p> <p>State and federal agencies adopt a “collective vision” for the Kissimmee-Okeechobee-Everglades ecosystem.</p> <p>REMOVE A WATER BLOCK</p>

Common Freshwater Plants and Animals

Birds	Mammals	Fish	Amphibians & Reptiles	Insects & Other Invertebrates	Plants	Trees
Anhinga	Round-tailed muskrat	Florida gar	Pig frog	Florida tree snail	Common cattail	Bald cypress
Pied-bill grebe	Raccoon	Bowfin (mudfish)	Squirrel treefrog	Apple snail	Maidencane	Pond cypress
Tricolor heron	River otter	Eastern mosquito fish	Green treefrog	Mosquito	Sawgrass	Red mangrove (estuarine)
Great blue heron	Bobcat	Blue spotted sunfish	Green anole (chameleon)	Dragonfly	Swamp lily	Black mangrove (estuarine)
Wood stork	Marsh rabbit	Bluegill (bream)	Brown water snake	Giant water bug	Spatterdock (yellow water lily)	Red bay apple
Great egret	White-tailed deer	Largemouth bass	Green water snake	Water boatman		Sweet bay
Snowy egret	Manatee (estuarine)		Florida softshell turtle	crayfish		
Limpkin	Atlantic bottlenose dolphin (estuarine)		Florida redbelly turtle			
Snail kite			American alligator			
Purple gallinule						
Least bittern						